

being discharged from the discharge port when the toner moves toward the edge portion during toner bottle rotation; and

a rib having a predetermined length, the rib being provided on the outer surface of the bottle body adjacent the end portion, the rib adapted to be sensed by the sensor in the image forming apparatus during toner bottle rotation in order to judge whether the rib exists at a predetermined position and extends for a predetermined ratio on the outer surface of the bottle body, to thereby discriminate toner bottle type.

15. (Pending) The toner bottle according to claim 14, wherein the rib extends in a circumferential direction along the outer surface of the bottle body.

16. (Pending) The toner bottle of claim 15, wherein the rib is formed at a predetermined position on the bottle body relative to the toner discharge port, the rib being aligned with the toner discharge port in an axial direction along the bottle body.

17. (Pending) The toner bottle according to claim 14, wherein the rib faces the sensor in the image forming apparatus during rotation of the toner bottle.

18. (Pending) An image forming apparatus in combination with the toner bottle according to claim 14, the image forming apparatus comprising:

a motor for rotating the toner bottle;
a motor driver for driving the motor;
a sensor for sensing the rib of the toner bottle and outputting a sensor signal; and
a CPU that controls the motor driver and discriminates the toner bottle using the sensor signal,

wherein the CPU rotates the toner bottle by controlling the motor driver, senses the rib using the sensor, outputs information indicating abnormality if the rib is not sensed by the sensor,

checks, if the rib is sensed, whether the rib has the predetermined ratio on the outer surface of the bottle body, outputs information indicating abnormality if the rib does not extend for the predetermined ratio, and outputs information indicating normality if the rib extends for the predetermined ratio.

19. (Pending) The image forming apparatus in combination with the toner bottle

according to claim 18,

wherein in order to check whether the rib extends for the predetermined ratio on the outer surface of the bottle body,

the CPU detects a first time interval that is based on when the sensor senses a first rib end portion of the rib during toner bottle rotation to when the sensor senses a second rib end portion,

detects a second time interval that is based on when the sensor senses the second rib end portion of the rib during toner bottle rotation to when the sensor senses the first rib end portion, and

checks whether the rib extends for the predetermined ratio on the outer surface of the bottle body based on the first and second time intervals.

20. (Pending) The image forming apparatus in combination with the toner bottle according to claim 18, wherein the CPU controls the motor driver to stop rotation of the toner bottle when the sensor finishes sensing the rib.

21. (Pending) A toner bottle for use in an image forming apparatus having a toner bottle sensor, the toner bottle comprising:

an elongated cylindrical body portion having an outer surface;

at least one groove extending around the outer surface of the cylindrical body portion;

a first end portion at a first end of the cylindrical body portion;

a second end portion at a second end of the cylindrical body portion opposite the first end portion in an axial direction along the cylindrical body portion;

a toner discharge port positioned at the first end portion on an outer circumferential surface of the toner bottle; and

a rib formed at the second end portion at a predetermined position relative to the toner discharge port and aligned with the toner discharge portion in an axial direction along the cylindrical body portion, the rib being configured for use to be sensed by the toner bottle sensor of the image forming apparatus to discriminate toner bottle type.

Cancel claim 22.

Cancel claim 23.

Cancel claim 24.

Cancel claim 25.

Cancel claim 26.

27. (Pending) The toner bottle of claim 21, wherein the first end portion has a diameter smaller than a diameter of the cylindrical body portion,
wherein the rib extends circumferentially for a predetermined angle relative to the outer surface of the cylindrical body portion, and
wherein the first end portion, with the toner discharge port, is positioned axially outside the groove.

28. (Pending) The toner bottle of claim 27, wherein the predetermined angle is less than 90 degrees.

Cancel claim 29.

30. (Pending) The toner bottle of claim 27, wherein the groove is a spiral groove that extends continuously without breaks from adjacent the second end portion to adjacent the first end portion.

Cancel claim 31.

32. (Pending) The toner bottle of claim 30, wherein the continuous spiral groove comprises a plurality of groove portions that extend parallel to one another in a direction circumferentially along the outer surface of the cylindrical body portion, the plurality of groove portions comprising a first groove portion, a second groove portion, and a third groove portion, wherein a first distance between the first groove portion and the second groove portion is equal to a second distance between the second groove portion and the third groove portion.

33. (Pending) The toner bottle of claim 27, wherein the first end portion is configured to engage with a rotatable holder guide in the image forming apparatus.

34. (Pending) An image forming apparatus in combination with a toner bottle according to claim 21.

35. (Pending) A method of discriminating toner bottle types, comprising the steps of:
providing a toner bottle, the toner bottle comprising:
an elongated cylindrical body portion having an outer surface,
at least one groove extending around the outer surface of the cylindrical body
portion,
a first end portion at a first end of the cylindrical body portion,
a second end portion at a second end of the cylindrical body portion opposite
the first end portion in an axial direction along the cylindrical body portion,
a toner discharge port positioned at the first end portion, and
a rib formed at the second end portion on an outer surface of the toner bottle;
rotating the toner bottle in an image forming apparatus;
sensing, using a sensor in the image forming apparatus, the rib while rotating the toner
bottle and, if the rib is not sensed, outputting information indicating abnormality; and
discriminating toner bottle type by checking, if the rib is sensed, whether the rib
extends for a predetermined ratio on the outer surface of the toner bottle, outputting
information indicating abnormality if the rib does not extend for the predetermined ratio, and
outputting information indicating normality if the rib extends for predetermined ratio.

Cancel claim 36.

37. (Pending) The method of claim 35, wherein the step of discriminating toner bottle
type comprises:
detecting, during the step of rotating the toner bottle, a first time interval that is based
on when the sensor senses a first rib end portion of the rib to when the sensor senses a second
rib end portion,
detecting, during the step of rotating the toner bottle, a second time interval that is
based on when the sensor senses the second rib end portion of the rib to when the sensor
senses the first rib end portion, and
checking whether the rib extends for the predetermined ratio on the outer surface of
the toner bottle based on the first and second time intervals.

38. (Pending) The method of claim 35, wherein the rib is positioned at a predetermined position on the toner bottle relative to the toner discharge port, and the rib is axially aligned with the toner discharge port in a direction along the cylindrical body portion.

39. (Pending) The method of claim 35, wherein the rib extends circumferentially for a predetermined angle relative to the outer surface of the cylindrical body portion.

40. (Pending) An image forming apparatus toner bottle, comprising:
a elongated cylindrical body portion having an outer surface;
a first end portion at a first end of the body portion;
a second end portion at a second end of the cylindrical body portion opposite the first end portion in an axial direction along the body portion;
a toner discharge port on an outer circumferential surface of the toner bottle positioned at the first end portion;
a groove comprising a spiral groove extending continuously without breaks around the outer surface of the body portion from adjacent the second end portion to adjacent the first end portion; and
a rib formed adjacent the second end portion at a predetermined position axially aligned with the toner discharge port along the body portion, the rib extending circumferentially along the outer surface of the body portion for a predetermined angle relative to the outer surface of the body portion.

Cancel claim 41.

42. (Pending) The image forming apparatus toner bottle of claim 40, wherein the spiral groove comprises a plurality of groove portions that extend parallel to one another in a direction circumferentially along the outer surface of the cylindrical body portion, the plurality of groove portions comprising a first groove portion, a second groove portion, and a third groove portion, wherein a first distance between the first groove portion and the second groove portion is equal to a second distance between the second groove portion and the third groove portion.

43. (Pending) The image forming apparatus toner bottle of claim 40, wherein the rib is capable of being used to discriminate toner bottle type,

wherein the first end portion has a diameter smaller than a diameter of the cylindrical body portion,

wherein the first end portion, with the toner discharge port, is positioned axially outside the groove.

Cancel claim 44.

45. (Pending) The toner bottle of claim 6, wherein the toner bottle further comprises:
an elongated cylindrical body portion having an outer surface;
at least one groove extending around the outer surface of the cylindrical body portion;
a first end portion at a first end of the cylindrical body portion;
a second end portion at a second end of the cylindrical body portion opposite the first end portion in an axial direction along the cylindrical body portion; and
a toner discharge port positioned at the first end portion,
wherein the object is formed at the second end portion.

46. (Pending) The toner bottle of claim 45, wherein the object is a rib.

47. (Pending) The toner bottle of claim 46, wherein the rib is formed at a predetermined position on the toner bottle relative to the toner discharge port.

48. (Pending) The toner bottle of claim 47, wherein the toner discharge port is aligned with the rib in an axial direction along the cylindrical body portion.

49. (Pending) The toner bottle of claim 48, wherein the first end portion has a diameter smaller than a diameter of the cylindrical body portion.

50. (Pending) The toner bottle of claim 46, wherein the groove is a spiral groove that extends from adjacent the second end portion to adjacent the first end portion.

51. (Pending) The toner bottle of claim 50, wherein the spiral groove extends continuously without breaks from adjacent the second end portion to adjacent the first end portion.

52. (Pending) The toner bottle of claim 51, wherein the continuous spiral groove comprises a plurality of groove portions that extend parallel to one another in a direction circumferentially along the outer surface of the cylindrical body portion.

53. (Pending) The toner bottle of claim 52, wherein the plurality of groove portions comprises a first groove portion, a second groove portion, and a third groove portion, wherein a first distance between the first groove portion and the second groove portion is equal to a second distance between the second groove portion and the third groove portion.

54. (Pending) The toner bottle of claim 53, wherein the toner discharge port is positioned on an outer circumferential surface of the first end portion.